AC-XG Audio Driver Ver21xx for Windows

YAMAHA Corporation
Semiconductor Division
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1 Introduction

The AC-XG WDM driver is software that controls AC'97 audio controller in the chipset and the AC'97 CODEC connected to the controller. The driver supports conventional Windows audio functions of Wave recording and playback as well as YAMAHA special functions of XG wave table synthesizer and Mic echo.
In power management functions, the AC-XG WDM driver fully supports power states of D0, D1, D2, and D3 and has an additional feature that supports YAMAHA-defined 4 low-power consumption levels for D0. With this additional feature, users are allowed to select the desired low power consumption level from the AC-XG control panel when the power state is D0.

2 System Requirements

2.1 Platform Support

Manufacturer	Chipset	Vendor ID	Device ID
Intel Corporation	i82801AA (ICH)	8086	2415
	i82801AB (ICH0)	8086	2425
	i82801BA (ICH2/ICH2-M)	8086	2445
	i82801CA(ICH3/ICH3-M)	8086	2485
	82443MX (440MX)	8086	7195
VIA Technologies Inc.	VT82C686A/B (Super South)	1106	3058
Silicon Integrated System	635/735	1039	7012
Acer Laboratories Inc.	M1535/D/+/D+	10B9	5451

2.2 Operating Systems

Windows 98 Second Edition
Windows ME
Windows 2000
Windows XP

2.3 Language Support

Japanese, English, French, Spanish, German, Italian, Portigish, Swedish, Korean, Traditional Chinese, Simpilfied Chinese, Dutch, Norwegian

2.4 Recommended Minimum System

CPU: PentiumMMX 233MHz or higher (MMX and FPU are required)
Memory: 64MB

2.5 CODEC Support

YMF752, YMF743, YMF753

3 General System Diagram

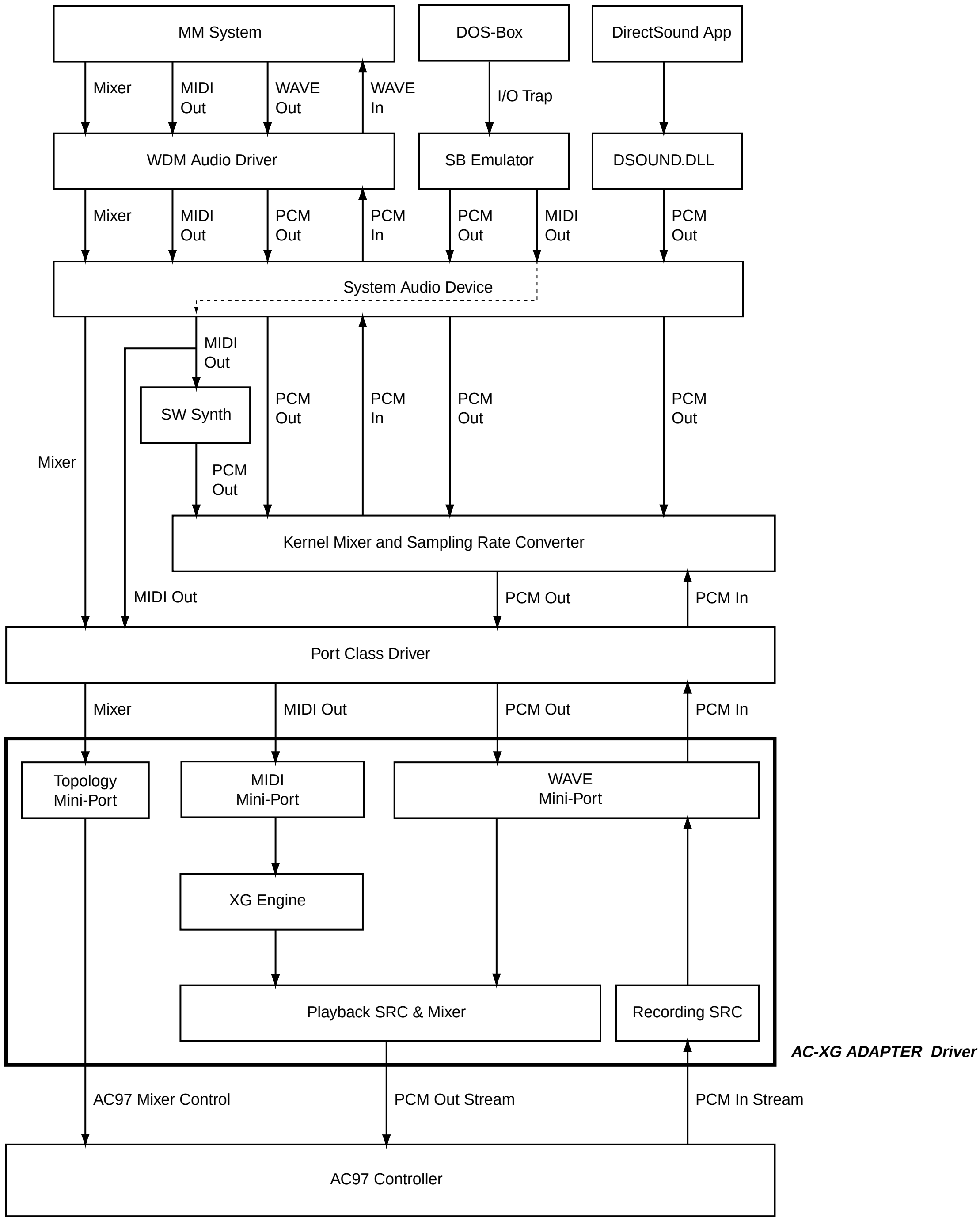


Figure 1. System Diagram

4 Basic Features

4.1 Wave Out Device

When YAMAHA AC-XG WDM Audio is selected as the preferred device under Sound Playback on the Audio tab of Sounds and Multimedia in Control Panel, the wave data can be played using Windows application via AC-XG WAVE OUT device. (However, if the application for playing wave data does not use Windows Wave Mapper and has its own specified Wave Out device, the selection of preferred device in Multimedia will be ineffective.)

. The AC-XG WDM Audio driver utilizes K-Mixer to support audio formats of 8-bit monoral, 8-bit stereo, 16-bit-monoral, and 16-bit-stereo at any sampling rates from 8kHz to 48kHz.
. The MINI Port driver only supports 16-bit-stereo PCM format at 44.1kHz and 48kHz.
. Compression file format is supported using standard Windows Audio Compression Driver.

4.2 Wave In Device

When YAMAHA AC-XG WDM Audio is selected as the preferred device under Sound Recording on the Audio tab of Sounds and Multimedia in Control Panel, the wave data can be recorded using Windows application via AC-XG WAVE IN device. (However, if the application for recording wave data does not use Windows Wave Mapper and has its own specified Wave IN device, the selection of preferred device in Multimedia will be ineffective.)

. The MINI Port driver supports audio formats of 8-bit-monoral, 8-bit-stereo, 16-bit-monoral, and 16-bit-stereo at any sampling rates from 8kHz to 48kHz.
. 8 recording sources listed below are supported. (Only one source can be selected at one time.)
Phone, Mic, Line, CD, Video, Aux, Stereo Out Loopback, Monoral Out Loopback + MIC
. Compression file format is supported using standard Windows Audio Compression Driver.
. Recording cannot be performed when the MIC echo mode is selected.

WaveOutDevice and WaveInDevice can support Full Duplex at different sampling rates.

4.3 Mixer Devices

The mixer devices can be controlled from Windows standard mixer application (Volume Control) and AC-XG Control Panel.
All playback volumes have a Mute function that allows you to turn off the sound of each device. Balance slider is not supported for mono sources. Bass and Treble are supported only for YMF743 and YMF753.

The volumes that can be adjusted via Windows standard mixer application are described below.

4.3.1 Playback Lines

. Line Out Volume
. *True Line Out Volume (*) (This volume can be linked to the Line Out volume.)*
. Mono Out Volume *(This volume can be linked to the Line Out volume.)*
. PC Beep Volume
. Phone Playback Volume
. Mic Playback Volume (option: +20dB Up)
. Line Playback Volume
. CD Playback Volume
. Video Playback Volume
. Aux Playback Volume
. Wave Playback Volume
. MIDI Playback Volume
. 3D Wide
. *ZV Port Playback Volume(**)*
. *Bass(**)*
. *Treble(**)*

(*) The driver only supports True Line Out Volume for YMF752.
(**) Bass and Treble are effective only for YMF743 and YMF753.

4.3.2 Recording Lines

The supported recording sources are listed below. Only one recording device is selectable at one time.
. Phone Recording Volume
. Mic Recording Volume
. Line Recording Volume
. CD Recording Volume
. Video Recording Volume
. Aux Recording Volume
. Stereo Out Recording Volume
. Mono Out+Mic Recording Volume

4.4 MIDI Out Device

When YAMAHA AC-XG WDM XG Synth is selected as the preferred device under MIDI Music Playback on the Audio tab of Sounds and Multimedia in Control Panel, the MIDI data can be played using Windows application via the driver's built-in Synthesizer. (However, if the application to play MIDI data does not use Windows MIDI Mapper and has its own specified MIDI device, the selection of preferred MIDI playback device in Multimedia will be ineffective.)

The driver's MIDI Out Device supports:

. GM / TG300B / XG.
. up to 128 voices simultaneously. (Refer to Customization specification.)
. 3 Synthesizer effects of Reverb, Chorus, and Variation. (This requires MMX compliance and FPU.)
. playing one MIDI file at one time.
. to return the parameters to their defaults, e.g., GM mode, when MIDI Out is opened.
. the number of following sound voices: 676 sound voices + 42 SFX sound voices + 21 Drum/SFX kits.
(In XG mode, the supported number of sound voices is: 480 sound voices + 42 SFX sound voices + 11 Drum/SFX kits)
. playback at 44.1/22.05/11.025 kHz. (Default: 22.05kHz)

FPU is required.

5 Extensions

5.1 MIC Echo Mode

The AC-XG WDM driver supports a MIC Echo mode that adds Karaoke (echo) effect to the Mic input before sending out to the Microphone. This feature is not available when wave recording is being performed, and visa versa.

The Mic Echo mode has 2 parameters of Feedback gain and Delay Time. You can adjust them in AC-XG Control Panel as desired.

5.2 Power Saving Mode

5.2.1 Device State

The AC-XG WDM driver supports Windows standard device power states listed below to reduce power consumption when the device is idle.

Device State	Settings of AC97	Description
D0	-	Power-Saving feature is not enabled.
D1	PR0, PR1	Digital paths are closed down and only analog paths are available.
D2	PR0, PR1, PR2, EAPD	Digital paths and major analog paths are closed down.
D3	PR0, PR1, PR2, PR3, EAPD (*)	Both digital and analog paths are closed down.

(*) When Secondary CODEC is not present or it is in D3 state, PR4 and PR5 will be set at the same time. In this case, however, PR5 will not be set for YMF743.

5.2.2 System State vs. Device State

In AC-XG WDM, the system states and device states are supports as below.

System State	Device State
S0	D0
S1	D3
S2	D3
S3	D3
S4 (Hibernation)	D3
S5 (Shutdown)	D3

5.2.3 Adjusting Power Management in the Control Panel

The AC-XG WDM driver supports YAMAHA special power-saving controls when the device is in D0 state. Description for how to use the properties sheet of Power Saving tab is arranged in 6.1.6 Power Saving later in this document.

When the AC-XG device is in D0 state, the AC-XG WDM driver will automatically shift the device to one of the modes listed below after the device has been idle for the user-defined elapsed time. When power consumption is reduced, however, either noise would be caused or the device would take more time to return active due to hardware characteristics. By considering the hardware characteristics, the AC-XG WDM driver supports 4 power level options that allow users to select an appropriate power level after the device enters the Standby mode.

Power Saving Mode	**Settings of AC97**	**Comments**
Full power level	-	The power saving is disabled.
Minimum level of power save	PR0, PR1	Digital paths are closed down but analog paths are available.
Intermediate level of power save	PR0, PR1, PR2, EAPD	Digital paths and major analog paths are closed down.
Maximum level of power save	PR0, PR1, PR2, PR3, EAPD	Both digital and analog paths are closed down.

5.3 SPDIF Out

The AC-XG WDM driver supports SPDIF output for YMF743 and YMF753. Sources can be output from SPDIF are WAVE and MIDI PCM data and analog sources such as Mic and Line-In.
AC-3 (DTS) bit stream is supported using NON-PCM pin in Windows ME, Windows 2000 with SP2, and Windows XP. It also supports a YAMAHA Renderer Filter to play AC-3 bit stream in all supported operating systems. This Renderer Filter can be used to control SPDIF channel status. Contact YAMAHA for the details of controlling SPDIF channel status via the Renderer Filter.

6 User Interface

6.1 AC-XG Control Panel

The AC-XG WDM driver can be configured via AC-XG Control Panel. User configurable settings are described below.

6.1.1 Various Settings

. Synthesizer Effect
. Mic Echo
. Power Saving
. Digital Output

The driver controls the display of each tab in the AC-XG Control Panel independently. Items shown in AC-XG Control Panel vary depending on configurations set for the driver installation as well as the chip installed in the computer. Unsupported items will not be shown. Refer to the Customization Specification for how to customize the items in AC-XG Control Panel.

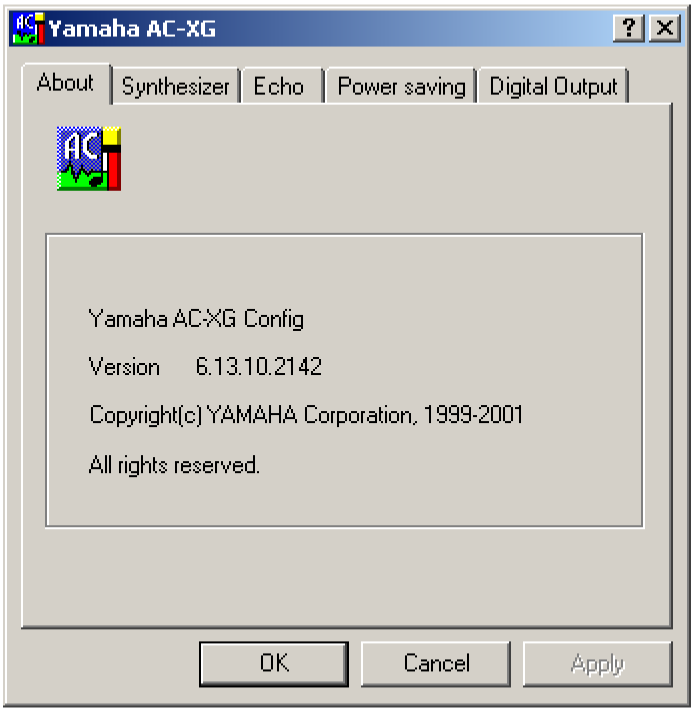
6.1.2 Button Operations

. Operations on buttons will not take effect until " OK" or "Apply" is clicked. However, any changes on sliders will be immediately effective.
. Clicking "Cancel" will undo the changes you made and quit the AC-XG Control Panel. The settings of AC-XG will remain unchanged as they were.
. Clicking either "OK" or "Apply" will cause the driver to update the registries.
. Clicking "Default" will initialize the configuration settings to their defaults.
. Right-clicking on any item in the driver control panel can pop-up its corresponding help file.

6.1.3 About

The About page shows the AC-XG WDN driver information.

Figure 2. About Dialog Box



6.1.4 Synthesizer

The XG Synthesizer page lets you change Synthesizer effect.

. Reverb : Reverb effect (ON/OFF)

. Chorus : Chorus effect (ON/OFF)

. Variation : Variation effect (ON/OFF)

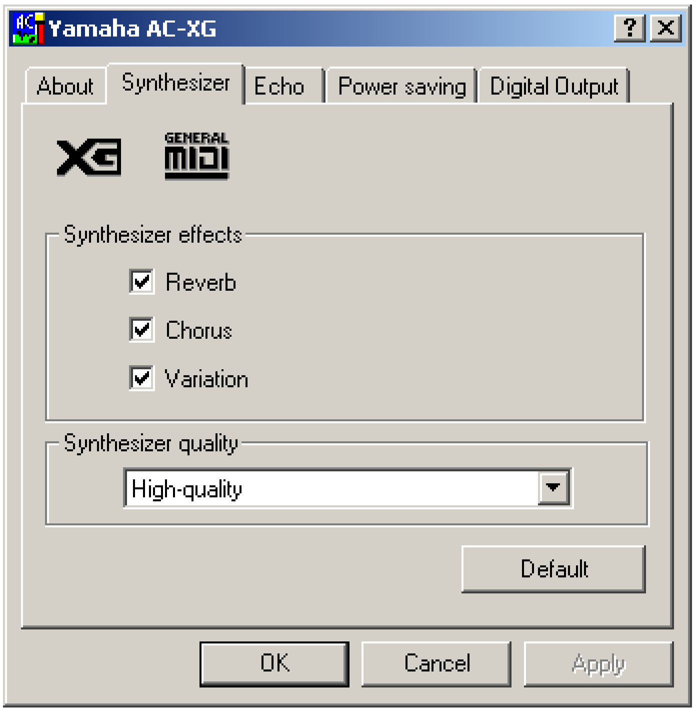
. Set up Synthesizer Playback Frequency:

High-quality :Fs=44.1kHz

Normal-quality :Fs=22.05kHz

Low-quality :Fs=11.025kHz

Figure 3. Synthesizer Dialog Box



6.1.5 MIC Echo

The MIC Echo page provides following options for setting up Mic echo effect.

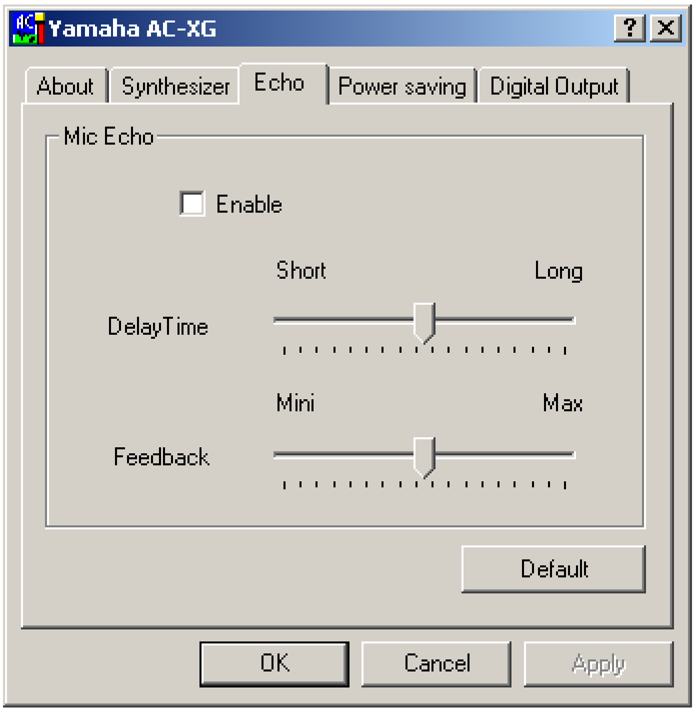
. Enable : Enable MIC echo effect (ON/OFF)

. Delay Time : The duration for Mic echo to repeat

. Feedback : The attenuation of Mic echo effect in every duration.

MIC Echo effect and recording cannot be used at the same time.

Figure 4. MIC Echo Dialog Box



6.1.6 Power Saving

The AC-XG WDM driver supports 3 device statuses: running (ON), power saving (Standby), and not working (OFF). The OFF status is a special status indicating that the device is not working. The normal hardware status should be either ON or STANDBY.

When the AC-XG device is in running status, e.g. in recording, playback, or reading/writing registers, the hardware status is ON. The status of AC-XG will go to Standby after the device has been idle for the user-defined elapsed time.

. Level of power consumption:

4 power consumption options are supported.

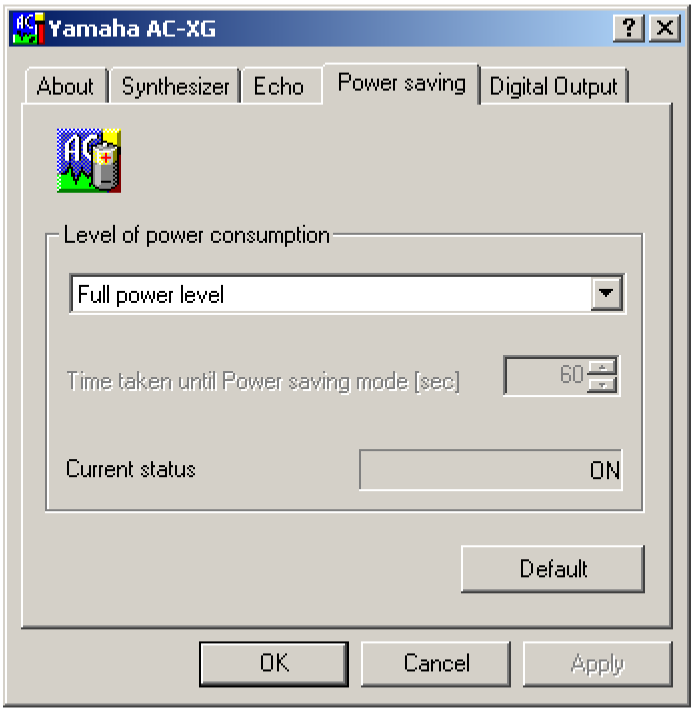
. Time taken until Power Saving Mode [sec]:

The device will go to the selected power-saving mode after it has been idle for the period time defined here.

. Current Status:

Display the current hardware status. ON or STANDBY.

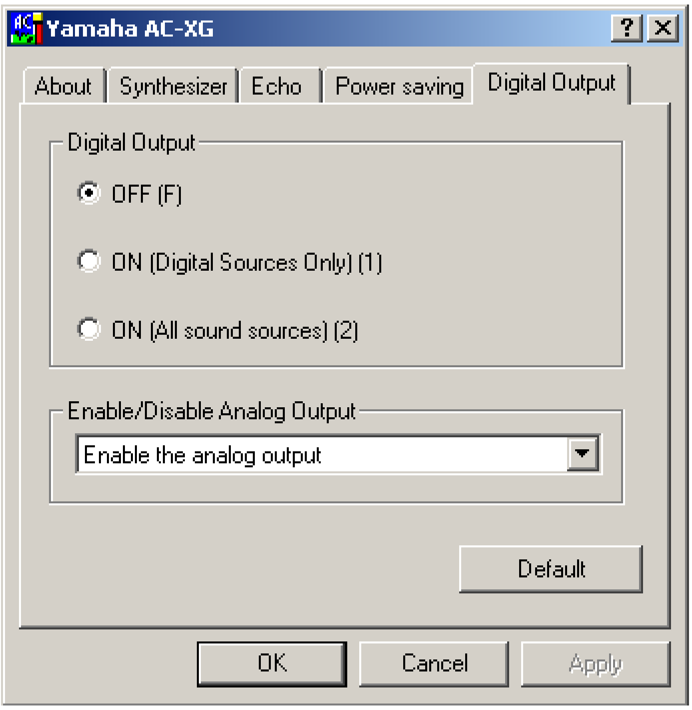
Figure 5. Power Saving Dialog Box



6.1.7 Digital Output

AC-XG supports 3 SPDIF output modes: OFF (Disable), ON (Digital sources only), ON (All sources are enabled).
When OFF is selected, the SPDIF output pin is fixed to low level. When ON (Digital sources only) is selected, WAV and MIDI data will be sent out from SPDIF for playback. When the SPDIF output mode is ON (All sources), all analog sources will be sent for AD (analog converted to digital), and digital data will be sent for DA (digital converted to analog) and AD and then output from SPDIF. In the Digital Output tab, you can select to enable or disable analog sources.

Figure 6. Digital Output Dialog Box



7 Revision History

Date	Revision	Comment
2001/9/27	1.05	. Support new chipsets of ICH3/ICH3-M(Intel) . Windows XP support . Change the display of AC-XG control panel
20001/3/9	1.04	. Support new chipsets of ICH2/ICH2-M(Intel) and M1535(Ali) . WinME support . New language support: Dutch and Norwegian . YMF753 support . Added description for NON-PCM support
2000/7/21	1.03	. Added description for SPDIF output . Added SPDIF Output in the Control Panel
2000/4/17	1.02	Added description for system state vs. device state
2000/4/17	1.01	Added description for not using PR5 for YMF743 in the power saving mode.
2000/2/9	1.00	. Added description “When the Secondary CODEC is not present or it is in D3 state, PR4 and PR5 will be set.” . Added section 5.2.3 . Updated figures of all Dialog Boxes . Added description for Synth Quality . Added description for Power Saving Tab
1999/12/2	0.90	Initial Release

